

tions with the jet on, and off. In the third the gas was contained in a metal cylinder closed at one end by a rock salt window and at the other provided with a stuffing-box, through which passed a rod carrying a blackened copper piston whose diameter was but slightly smaller than that of the interior of the cylinder. By changing the position of the piston the length of the radiating column of gas could be regulated as desired. The cylinder was heated by means of four large Bunsen burners. With this arrangement both temperature and pressure could also be varied. Convection currents were very troublesome, and the temperature as determined by the thermometer in the cylinder was uncertain, except when the apparatus had been cooling for a considerable time.

Having described in detail these various methods of work and given numerous tables of un-reduced observations, he devotes some thirty pages to a discussion of some of Tyn-dall's experiments, and of the work done by Paschen, Angström, and others on the radiation and absorption of gases. From the work of these men he obtains certain correction terms which he applies to his observations, and in Table 73, page 112, gives his final results. In my examination of the memoir I have been unable to discover which of the 72 preceding tables contain the observations, which, when corrected by a process also not very clear to me, will give this table. However, as he says that this gives merely "an approximate conception of the relations between total radiation" from unit surface under different conditions of temperature and depth of layer, this makes but little difference.

In conclusion he states: "The results of the present research prove that within moderate depths of only a few meters the radiation of dry air, purified from carbon dioxide, increases quite uniformly with the depth." The radiation from a layer of air one meter deep at 50° C and atmospheric pressure is 0.00068 radim, "as compared with one at 0° C," and for a similar layer of carbon dioxide it is 0.00238 radim, or about three and one-half times that of air. Further increase in depth of carbon dioxide adds but little (at this temperature) to the radiation. The radiation from a layer of steam 152 cm. deep, and at one-sixth of atmospheric pressure, is eight-tenths of that of a black body.

Considering the importance of the work it is a pity more pains were not taken to maintain the radiating gas at a uniform and constant temperature.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR SEPTEMBER.¹

By Prof. E. B. GARRIOTT.

The following statements are based on average weather conditions for September, as determined by long series of observations. As the weather for any given September does not conform strictly to the average conditions, the statements can not be considered as forecasts.

In the middle latitudes of the Northern Hemisphere the settled weather of summer begins to give way to the more pronounced weather types of autumn. In the tropical regions of the oceans September marks the height of the hurricane season.

Over the North Atlantic Ocean the great permanent high barometer area near the Azores decreases in magnitude, and the severer storms which advance from the American continent or adjacent waters pursue a more southerly course than during August. Storms of this class which cross the Atlantic from the American to the European coast average about two a month in September, and the likelihood of encountering them along the transatlantic steamship routes is greater than during the two preceding months. Fog is less frequent over and near the banks of Newfoundland than during August, and the average southern limit of Arctic ice in the North Atlantic is in about latitude north 47°.

All parts of the West Indies are subject to hurricane visitations in September. The hurricanes of this month are, however, somewhat more frequent in an area which embraces Santo Domingo, Haiti, and eastern and central Cuba, where they average about one in three years. The smaller diameter of the vortex of a hurricane renders it improbable that any locality in the area referred to will experience a hurricane oftener than about once in fifteen years. The hurricanes of September sometimes recurve north and northeast along the Atlantic coast of the United States and disappear over the Atlantic east of Newfoundland, and others pass westward over the Gulf of Mexico. The exceptionally destructive character of many of these storms should prompt all possible protective measures in the line of their probable advance as indicated by the warnings of the Weather Bureau.

The typhoons of the Philippine Islands and the China and Japan seas and coasts usually advance from the region east of the Philippine Islands, between the tenth and twentieth parallels of north latitude, move westward, their centers crossing the Philippines north of the fifteenth parallel, and, in a majority of cases, recurve north and northeast near the China coast and pass thence over or near the Japanese Islands. A small proportion of these storms move westward over the China Sea, and in rare instances typhoons appear to originate over the eastern part of the China Sea. The severe September typhoons average about one a year. Torrential rains are of almost daily occurrence in the Philippine Islands in September.

In the United States the most important storms of September advance from the West Indies and the Gulf of Mexico to the Atlantic and Gulf coasts. Storms of this class commonly possess great strength, and on an average of about once in two years they are destructive to shipping and coast industries. Over the Great Lakes gales of marked strength occur on an average about once in each September. As the month advances the rains which occur east of the Mississippi become general, rather than local, in character, and attend the passage of well-marked storms. September is a month of heavy subtropical rains in the south Atlantic and east Gulf coast districts, and a second maximum of rain occurs in the Lake region. Except in the lower Missouri Valley, on the north Pacific coast, and in areas in the Southwest, the rainfall west of the Mississippi is usually very light in September, and over great parts of the middle Plateau region and California no rain, as a rule, falls in that month. During the last half of September killing frost is likely to occur in the Northwestern States and the Lake region, and frost is not uncommon in the Ohio Valley and Tennessee toward the close of September.

¹The first of this series was for August, 1900, and will be found in the MONTHLY WEATHER REVIEW for that month on page 342.